# BS 216

# DUAL CHANNEL MASTER STATION

# USER MANUAL

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## 1.0 SAFETY INSTRUCTIONS

**Please always follow these instructions to help ensure against injury to yourself and/or damage to the system**

1. Read all safety and operating instructions before you operate the apparatus.

2. Retain all safety and operating instructions for future reference.

3. Heed all warnings on the apparatus and in the safety and operating instructions and follow all installation and use instructions.

4. Follow all installation, operating and use instructions

5. Unplug the apparatus from the AC power outlet before cleaning. Use only a damp cloth for cleaning the exterior of the apparatus.

6. Do not use accessories or attachments not recommended by the manufacturer, as they may cause hazards and void the warranty.

7. Do not operate this apparatus in high humidity areas or expose it to water or moisture.

8. Do not place the apparatus on an unstable cart, stand, tripod, bracket or table. The apparatus may fall, causing serious personal injury and damage to the apparatus.

9. Do not block or cover any openings in the apparatus. These are provided for ventilation and protection from overheating. Never place the apparatus near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat. Do not place the apparatus in an enclosure such as a cabinet without proper ventilation.

10. Operate the apparatus using only the type of power source indicated on the marking label. Unplug the apparatus' power cord by gripping the power plug, not the cord.

11. Insert the plug properly. Do not defeat the safety purpose of the polarized or grounding-type plug. An American polarized AC line plug has two blades with one wider than the other. This plug will fit only one way into the power outlet. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug still fails to fit, contact an electrician to replace the obsolete outlet. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician to replace the obsolete outlet.

12. Route power supply cords so that they are not likely to be walked on or pinched by items placed upon or against them. Pay particular attention to cords at plugs, convenience receptacles, and the point where they exit from the apparatus.

13. Do not overload wall outlets or extension cords, as this can result in a risk of fire or electrical shock.

14. Unplug this apparatus during lightning storms or when unused for long periods of time.

15. Never insert objects of any kind into the apparatus through openings, as the objects may touch dangerous voltage points or short out parts. This could cause fire or electrical shock.

16. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

## 2.0 GENERAL DESCRIPTION

The BS 216 (19”/1RU) is designed to be a master station in an ASL intercom system. To connect the unit to its remote intercom stations, use professional microphone cable (2 conductors and 1 shield) only.

Each channel has a Volume (listen level) control, a TALK and a CALL button with LED indicators.

With a headset connected to the XLR-4 headset connector one can talk and listen to each channel separately or to both channels simultaneously. With side tone trimmers one may adjust the listen level of one’s voice in one’s headset.

The built-in power supply is fully protected against short circuit or excessive thermal condition and can safely drive up to 15 Basic Series beltpacks operating at full power.

An Aux input connector at the rear panel allows injecting external audio signals of line or mic level into the intercom lines.

When ‘mic level’ is selected, +30V phantom power is available at the Aux input connector.

The unique ASL Call system provides both a flashing red LED and a very distinctive sound signal. A slight touch of the CALL button makes the call LED flash, whilst holding the button for 2 seconds the call sound signal is activated.

Special attention has been paid to the intelligibility of speech. By applying low noise/high speed circuitry, a speech presence filter and a specially designed headphone amplifier, communication is very comfortable even in environments with high background noise levels.

## 3.0 MECHANICAL INSTALLATION

For the BS 216 a vertical rack space of 1U (1.75”, 44mm) is required. It is not necessary to provide rear support by extra bracing or shelving. Adequate ventilation must be provided by allowing sufficient space around the sides and rear of the unit to ensure free circulation of air.
Forced cooling is not required.
The power supply regulator is mounted on the rear of the unit; after a period of time it will feel hot to the touch. This is quite normal, and should be no cause for alarm.

## 4.0 MAINS POWER & SAFETY EARTH

**Connecting to mains power:**

The BS 216 may be connected to a mains power outlet which provides 100 – 240 V AC, 50-60 Hz and at least 60 watts. The outlet should have a clean earth. Avoid using mains power outlets which also power dimmer controlled lighting equipment.

The wires in the mains lead are color coded:

| | |
|---|---|
| green/yellow: | Earth / safety ground |
| blue: | Neutral |
| brown: | Live |

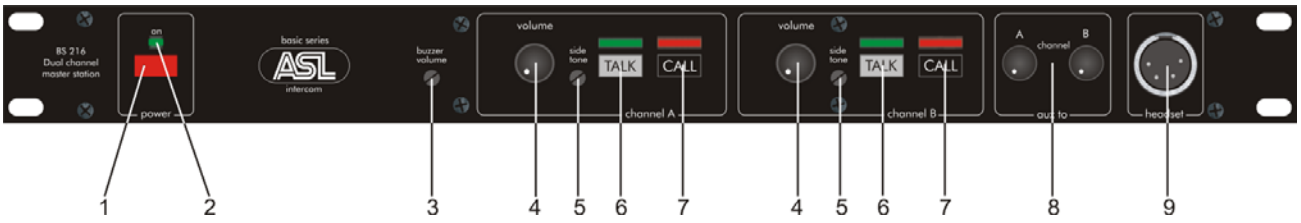
In case the wires in the mains lead do not correspond with the colored markings identifying the terminals in your mains plug, proceed as follows:

- The wire which is colored green/yellow must be connected to the terminal in the plug which is marked with the letter “E”, or by the ground symbol, or is colored green.
- The wire which is colored blue must be connected to the terminal which is marked with the letter “N” or colored black.
- The wire which is colored brown must be connected to the terminal which is marked with the letter “L” or colored red.

**Safety Earth:**

**The green/yellow wire of the mains lead must always be connected to the electrical installation safety earth or ground**.
This is essential for personal safety as well as for proper operation of the BS 216 and the other connected stations. The green/yellow wire is in the BS 216 connected to all exposed metal surfaces. Any rack framework into which this unit might be mounted is assumed to be connected to the same grounding circuit.

## 5.0 FRONT PANEL CONTROLS & CONNECTOR




### 1 POWER ON/OFF switch
Mains power push button for switching ON and OFF the internal power supply.

### 2 MAINS POWER LED
This LED illuminates if line power is supplied by the internal power supply.

### 3A BUZZER VOLUME trimmer
This trimmer adjusts the volume of the buzzer.

### 3B BUZZER
This buzzer indicates an incoming or outgoing call. It is activated by pushing a CALL button on this station or a CALL button on any other station for longer than two seconds.
The volume of the buzzer may be adjusted with the buzzer volume control.

### 4 VOLUME A & B control knobs
These knobs adjust the listen level for the headset. Each channel has to be adjusted separately.

### 5 SIDE TONE trimmers
These trimmers adjust the level of one's voice as heard in one's headset.
Adjustment procedure (for each channel separately):

- set the trimmer in start position: fully clockwise
- switch off the microphones of all connected stations
- push the TALK button of the channel
- turn up the volume of the channel
- speak into the headset microphone
- adjust the listen level by turning the side tone trimmer of the channel.

The trimmer operating area is between fully clockwise and minimum level. Adjusting the side tone does not affect the level of your voice as heard by other stations.

### 6 TALK A & B buttons + LED's
These buttons allows the user to talk to each channel separately or to both channels simultaneously. The large green LED's indicate if the talk function is activated.

### 7 CALL A & B buttons + LED's
A Call button activates the Call system.
By a momentary push a Call signal is sent to all stations connected to the referring intercom channel. The Call LED on this station and on all to the channel connected stations starts flashing. Pushing and holding a Call button for 2 seconds activates the call buzzer in all stations. After the CALL button is released the Call LED's continue to flash for a further 2 seconds.

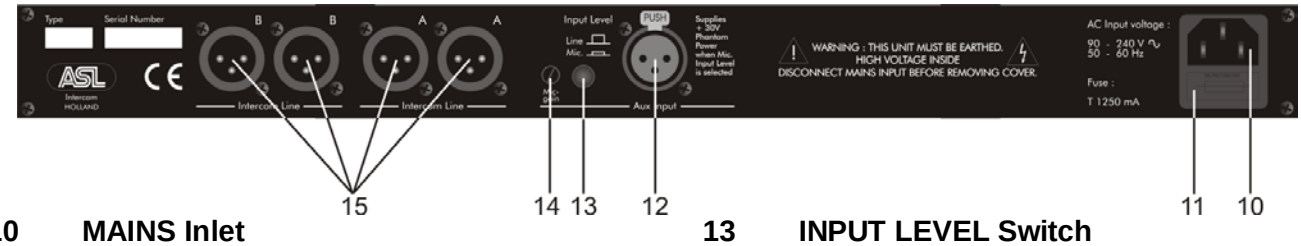
### 8 AUX VOLUME controls A & B
These knobs adjust the level of the Aux input signal to each of the two intercom lines.

### 9 HEADSET connector
A XLR-4 type connector to connect a headset. The can impedance must be minimum 200 ohms. The headset microphone may be of the dynamic or electret type.

Pin assignments:

| | |
|---|---|
| Pin 1: | shield mic. (GND) |
| Pin 2: | mic. + |
| Pin 3: | phones + |
| Pin 4: | phones – |

## 6.0 REAR PANEL CONTROLS & CONNECTORS




### 10 MAINS Inlet
IEC Mains connector

### 11 FUSE Holder
The fuse protects the BS 216 against severe internal damage, in case of malfunction in the power section. **Before replacing a fuse the mains cord must be disconnected from the mains outlet.**

### 12 AUX INPUT connector
This aux signal input is electronically balanced and accepts audio levels between –18dBu to +22dBu on line level, and –38dBu to +2dBu on mic level. When mic level is selected, +30 V DC phantom power is supplied to the XLR-3 aux input connector. Pin assignments :

| | |
|---|---|
| Pin 1. | 0V / ground |
| Pin 2: | signal + |
| Pin 3: | signal – |

### 13 INPUT LEVEL Switch
When mic level is selected, +30V DC phantom power is supplied to pins 2 and 3 of the XLR-3 aux input connector.

### 14 MIC GAIN Trimmer
To adjust the input gain when mic level is selected (see #13)

### 15 A & B LINE connectors
These XLR-3 type connectors are for connecting remote stations, using standard microphone cable. There are 2 connectors for channel A and 2 connectors for channel B.

Pin assignments:

| | |
|---|---|
| Pin 1: | 0V / ground shield |
| Pin 2: | +30V DC power wire |
| Pin 3: | audio wire |

## 7.0 INTERNAL CONTROLS

**MIC GAIN:** The mic gain is adjusted by a trimmer located on the PCB near the headset connectors
.

## 8.0 TECHNICAL SPECIFICATIONS

**System**
Dynamic range: 80 dB (1kHz, THD <1%)
Frequency response: 200 Hz - 15 kHz (-3 dB)
Call signal (send): +2.8 mA
Call signal threshold (receive): +2.4 V DC
Operating voltage: 24 - 32 V DC

**Intercom line**
Impedance: 350 Ω (1 kHz), 2.2 kΩ (DC)
Audio level: nom. -18 dBu, max. 0 dBu

**Switch Mode Power Supply**
Mains voltage: 100 - 240 V AC, 50/60 Hz
Output voltage: +30 V DC (+/- 5%)
Max output power: 45 W
Max power consumption BS 216: 60 watts

**Headphone Driver Amp**
Max. output level: 11.6 Vrms (at 200 Ω)
Max. output power: 0.7 Wrms (at 200 Ω)

**Mic Pre-amp**
Gain: 40 - 60 dB (adjustable internally)
Presence filter: +6 dB @ 5 kHz
Power to electret mic: +9 V DC

**Side Tone** Rejection: 0 - 30 dB adjustable

**Buzzer** Max. SPL: 85 dBA

**Aux Input**
Input Impedance:
30 kΩ (line level)
4.6 kΩ (mic level)
Nominal Input Level:
0 dBu (line level)
-30 dBu (mic level)
Max. Input Level:
+22 dBu (line level)
0 dBu (mic level)
Phantom Power:
+30 V DC (mic level selected)

*0 dBu defined as 775 mV rms into open circuit.*
*ASL reserves the right to alter specifications without prior notice*

## 9.0 PARTY LINE, TECHNICAL CONCEPT

User stations in an ASL intercom system are connected via one or several 'party lines'. A party line offers two way ('full duplex') communication and consists of standard microphone (multi-pair) cable. One wire is used as an audio line, one as a power line and the screen of the cable functions as earth/return.
Current drive is used for signal transfer. Each station utilizes a current amplifier to amplify the microphone signal and place it on the common audio line where, due to the constant line impedance (situated in the power supply between XLR pin 3 and 1), a signal voltage is developed which can be further amplified and sent to the headphones or loudspeakers.

This principle has three advantages:

- the use of a single audio line allows several stations to talk and listen simultaneously
- due to the high bridging impedance offered by each station, the number of stations on the party line has no influence on the level of the communications signal
- power and audio to the intercom stations use the same cable

The Call signal is also sent as a current on the audio line. It develops a DC potential over the line impedance which will be sensed by each station and interpreted as a Call signal.

## 10.0 CABLING

The intercom lines (the 'party lines') are of the shielded two-conductor microphone cable type. The intercom line connectors are of the XLR-3 type. Audio and Call signals are on XLR pin 3, DC power is on XLR pin 2.
XLR pin 1 is connected to the shield of the cable which functions as the common return for audio and power.

The audio signal is transferred in an unbalanced way (see 'Party Line, Technical Concept').
To avoid earth loops (hum), the possible effect of electromagnetic fields and to minimize power loss, certain rules have to be obeyed when installing the cabling of an intercom system :

**Use high quality cable**
Use high quality microphone cable (shielded two conductor cable, minimum 2x 0.30 mm2).
In case multi-pair microphone cable is used, it should be of high quality and each pair should consist of two conductors (minimum 2x 0.15 mm2) with separate shield and an overall shield.

**Use flexible cable**
Use flexible single and multi-pair microphone cable instead of cable with solid cores, especially when the cable is subjected to bending during operation or installation.

**Cable screens to XLR pin 1**
The screen of each separate microphone cable and/or the screen of each single pair in a multi-pair cable, should be connected to pin 1 of each XLR-3 connector. Do not connect these screens to the metal housing of ASL unitst or XLR-3 wall boxes. See section 'Earthing Concept'.

**Connect metal cable trunks, wall boxes and overall multi-pair cable screens to clean earth**
Metal cable trunks, metal wall boxes and overall multi-pair cable screens should be interconnected and, at the 'central earth point' in the intercom network only, be connected to a clean earth or a safety earth. (see section 'Earthing Concept').

**Keep metal connection boxes and cable trunks or pipes isolated from other metal parts**
Metal trunks or pipes for intercom cables and metal connection boxes should be mounted in such a way that they are isolated from any other metal housing or construction part.

**Keep cables parallel as much as possible**
When two (multi channel) units in a network are connected by more than one cable, make sure that these cables are parallel to each other over the whole distance between those units. When using multi-pair cable, parallelism is ensured in the best possible way.

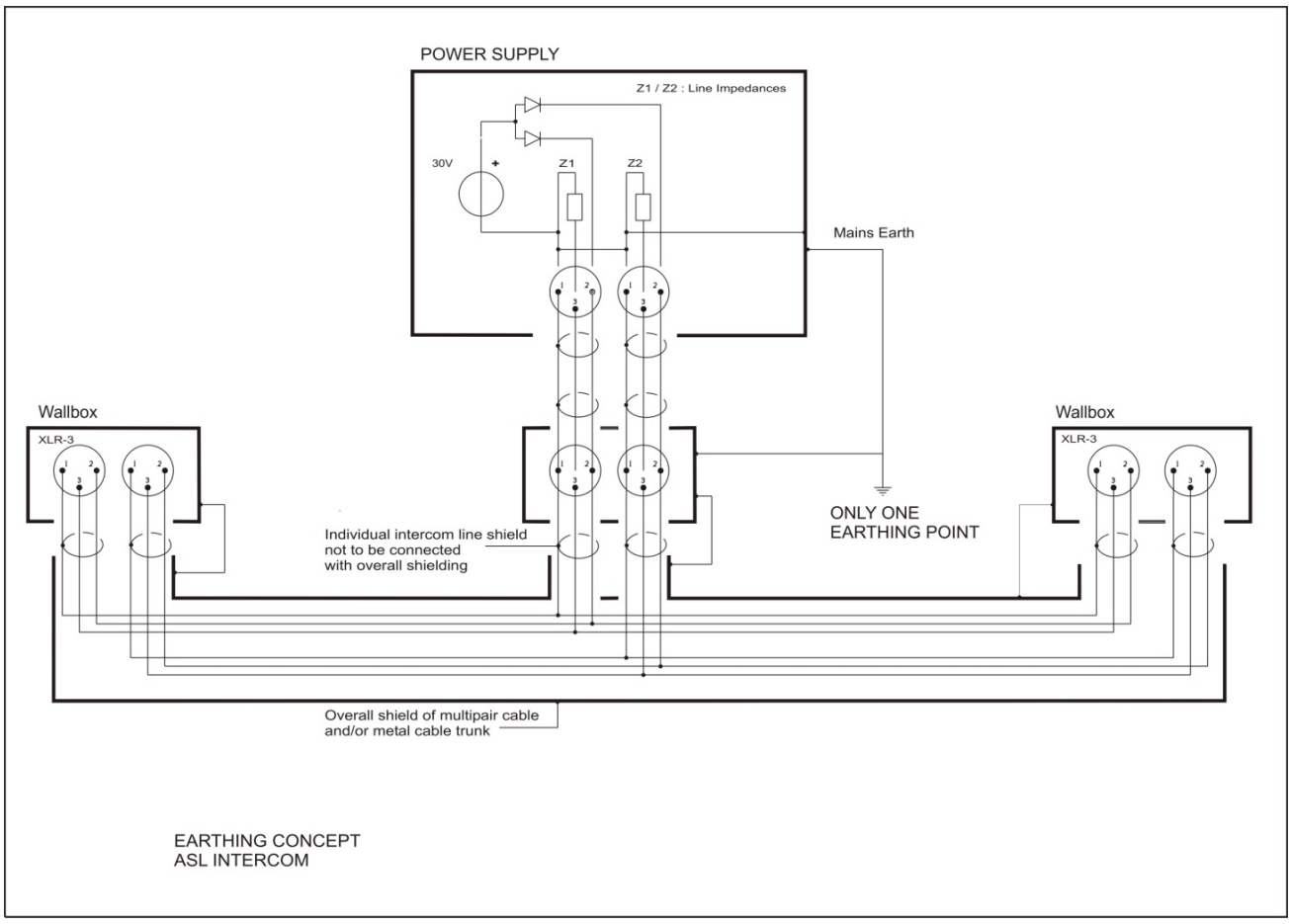
**Avoid closed loops**
Always avoid that intercom cables are making a closed loop. So-called 'ring intercom' should not physically be cabled as a ring..

**Keep cables away from electromagnetic sources**
Keep intercom cables away from high energy cables, e.g. 115/230/400V mains power or dimmer controlled feeds for spotlights. Intercom cables should cross high energy cables at an angle of 90º only. Intercom cables should never be in the same trunks as energy cables.

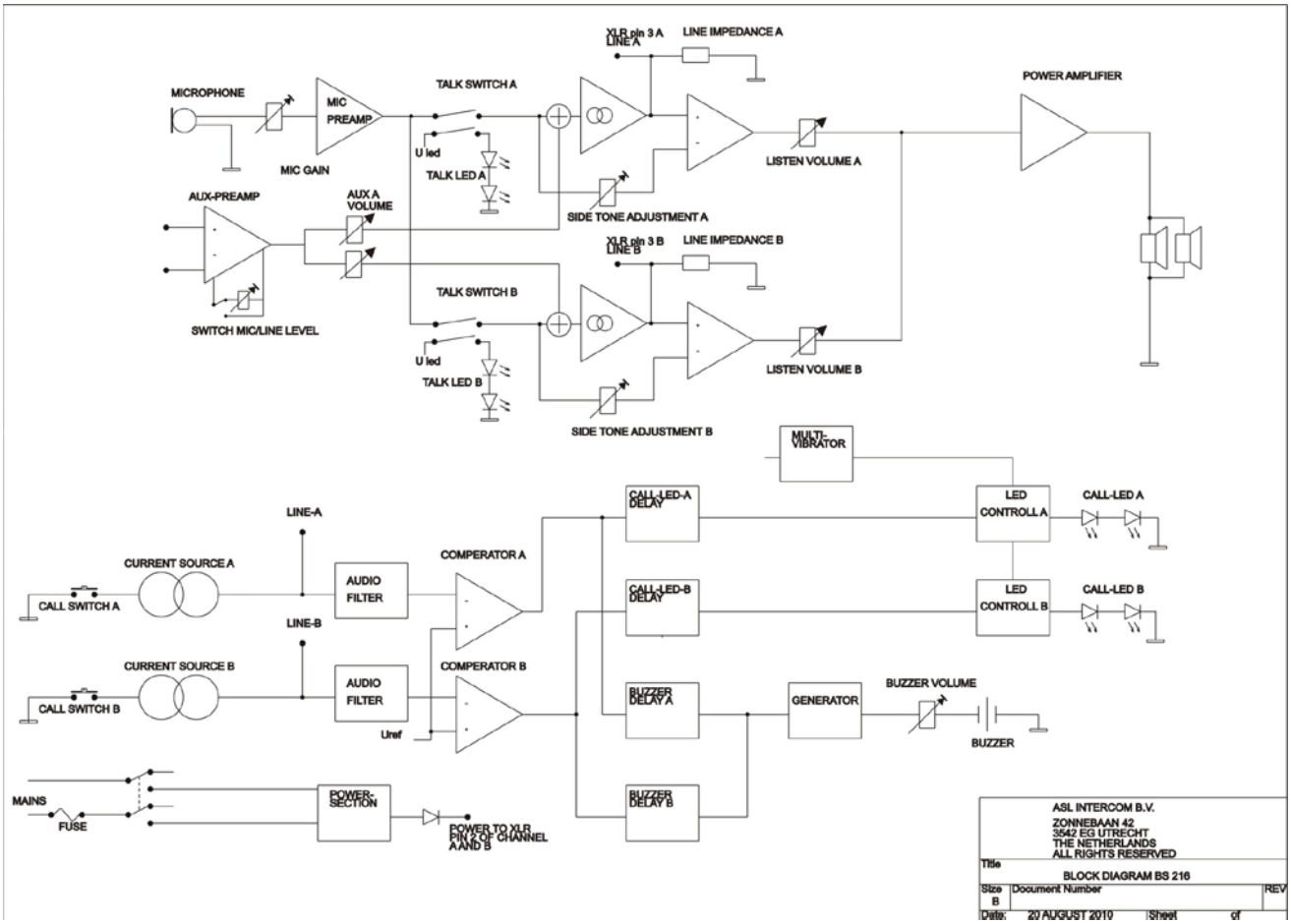
**Place power supply in a central position**
In case of a system powered by a separate power supply: In order to diminish power losses, place the power supply as close as possible to where most power consumption occurs, in other words most user stations are placed.

**ASL powered units to a 'clean' mains outlet**
Master stations or power supplies should be connected to a mains outlet with a clean earth. Other audio equipment may be connected to this mains outlet, but avoid using an outlet which also powers dimmer controlled lighting systems.

## 11.0 EARTHING CONCEPT




## 12.0 BS 216 BLOCK DIAGRAM



## 13.0 POSSIBLE SYSTEM CONFIGURATION